SUCCESS STORY

PUMPING UP EFFICIENCY

INFORMATION

Industry:
Water and Pumping

Application:
Wastewater Retrofit

Product:
U1000 Industrial Matrix Drive

OVERVIEW

When Springfield City, Missouri encountered an issue with its primary municipal wastewater facility, they solicited the expertise of JCI Industries, based in Joplin, Missouri. Collaborating with Yaskawa America, Inc. for over two decades, JCI has been providing comprehensive solutions for water and wastewater treatment facilities, including drive, motor, and pump systems. The Springfield municipal wastewater facility, currently the third largest treatment plant in Missouri, stands as a NACWA Platinum 12 Peak Performance award winner for its low carbon footprint and highly efficient pumping and water purification operations.

APPLICATION CHALLENGE

The established system, an 18-pulse Benshaw model AC drive, powered four 350 HP wastewater lift pumps. Approximately 12-13 years into its operational life cycle, it began experiencing technical issues, particularly with its crucial power supply components.

The resolution required meeting two major objectives. Firstly, it was essential to retain the same physical size as the current Benshaw drives, which necessitated the reuse of the existing enclosures. Secondly, the drive's harmonic performance and efficiency needed to meet, if not surpass, the previous standards. Additionally, the utility aimed to minimize their motor drive systems' heat output to lower the ambient temperature of the MCC room and potentially enhance the vibration performance of the pumps.

THE YASKAWA SOLUTION

JCI retrofitted the Benshaw drive system with Yaskawa's U1000 Industrial Matrix drive. With the application of direct AC-to-AC technology used by Matrix drives, JCI could dispense with the 18-pulse transformers and magnetic-producing reactors, considerably simplifying the system setup. Also, the intricate external 12-pulse + 6-pulse line side harmonic attenuating power supply was supplanted by the direct AC-to-AC U1000 technology.

RESULTS

The Benshaw drive system's magnetic elements and harmonic attenuation power supply devices were successfully removed by the customer. The U1000 chassis drives were smoothly incorporated into the enclosures, and the principal input circuit breaker was reused. It was also possible to preserve the existing pump system controls. Notably, there were reductions in overall watt loss related to the system, and efficiency saw an improvement of approximately 5% compared to the replaced 18-pulse technology.

Satisfied with the project's outcomes, the customer is now considering retrofitting more drives within this plant and at other sites.

SUCCESS STORY

PUMPING UP EFFICIENCY

Innovative Matrix Technology

The U1000 can be used for standard and regenerative applications with the unique advantage of direct AC-to-AC power conversion. This unique design offers the best choice for induction motors (IM) and permanent magnet motors (PM). Benefits include low input current harmonics with near unity power factor allowing for increased energy efficiency. The bi-directional switching technology allows for continuous motoring or continuous regeneration. This means that fewer parts are required, leading to higher machine reliability. Moreover, the U1000 can automatically switch into across-the-line operation through the drive, eliminating drive generated harmonics, drive losses, and motor noise.

Low Harmonic Solution

The U1000 offers the best low harmonic solution in one unit. It does not need any external devices for IEEE 519 compliance. Its harmonic performance meets the most stringent requirement of IEEE 519 at the input of the drive, making it an all-around green solution. Its input harmonics remain low, not just at rated power, but well below leading harmonic solutions throughout the speed/load range.

Clean Power

The sinusoidal input current, with a total harmonic distortion of less than 5%, and a displacement power factor of approximately 1.0, minimize losses in grid components like generators and transformers. This, at the same time, greatly reduces the potential of disturbance of other devices and improves the reliability of your system.

Energy Saving 4Q Operation

Thanks to matrix technology, the U1000 can operate in full, continuous regeneration. It is your best drive for applications like conveyor, winder, escalator, lift or test bench, where braking energy needs to be considered. The AC-to-AC design does not require any braking resistor which takes space in the cabinet and creates additional heat during regeneration. Best of all, no parameter settings are needed to enable the U1000's regeneration. The U1000 can instantaneously and automatically switch from full motoring operation to full regenerative operation.

Compact Size

The U1000 is an all-in-one compact solution for low harmonics and regeneration. There is no smaller solution. Save as much as 80% space. Retrofits and upgrades are easy, since it easily fits in nearly every 18-Pulse package.

Cost Saving

The U1000 provides cost-saving benefits through a simplified installation and smaller panel requirements. The U1000 eliminates braking resistors that convert regenerative energy into heat which can be a safety concern in some application environments.

Time-Saving Installation

As no external components like harmonic filters or active front end units are required, connecting a U1000 drive becomes a matter of minutes. 3 wires in, 3 wires out. It cannot be easier to build a low harmonic regenerative solution.

CONTACT US

Yaskawa America, Inc.
2121 Norman Drive S, Waukegan, IL 60085, U.S.A.
+1-800-YASKAWA (927-5292)
www.yaskawa.com

Yaskawa Europe GmbH
Philipp-Reis-Str. 6, 65795 Hattersheim am Main, Germany
+49-6196-569-300
www.yaskawa.eu.com

Yaskawa Elèctrico Do Brasil Ltda.
777, Avenida Piraporinha, Diadema, São Paulo, 09950-000, Brasil
+55-11-3585-1100
www.yaskawa.com.br

Yaskawa Electric Corporation
New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo, 105-6891, Japan
+81-3-5402-4502
www.yaskawa.com.jp